1 Introduction

- Amount of distortion proportional to input level for most implementations
- Needs careful, manual setting of gain or threshold controls for different input signals and varying levels
- Evaluation of distortion effect that scales the transfer function with moving average of signal level
- Member of adaptive audio effects (A-DAFx) and suitable for use in autonomous mixing systems

2 Threshold automation

Transfer function scaled by exponential moving average of RMS level

\[ \text{L}_{\text{RMS}}[n] = \sqrt{(1 - \alpha) \cdot x^2[n] + \alpha \cdot \text{L}_{\text{RMS}}[n-1]} \]

with \( x \) the input signal, and \( \alpha = \exp \left( -\frac{1}{\tau \cdot f_s} \right) \) where \( \tau \) is the characteristic time constant and \( f_s \) the sampling rate.

3 Threshold automation with lookahead

Transfer function scaled by

\[ \text{L}_{\text{max}}[n] = \sqrt{\left(1 - \alpha \right) \cdot \max \{ x^2[n], x^2[n+1], \ldots, x^2[n+L] \} + \alpha \cdot \text{L}_{\text{max}}[n-1]} \]

4 VST plugin

Multiband VST plugin based on the proposed algorithm

5 Further automation

Make-up gain: RMS level or loudness normalisation to compensate for trimmed signal peaks
Anti-aliasing: upsampling ratio based on Nyquist frequency, type of distortion, signal content, and/or user input
Subband gain: approach certain target power per subband (e.g., automatic exciter)

6 Perceptual evaluation

- Four real-word test signals (vocal, Rhodes piano, bass guitar and drums) with artificial 10 dB boost halfway through fragment
- Perceptual evaluation with \( N = 9 \) participants
- Perceived amount of distortion consistent
- No significant difference between Auto 1 and Auto 2 (lookahead)